

Grizzly Publications

Journal Papers

- Chakraborty, P. and S. Bulent Biner, "Crystal plasticity modeling of irradiation effects on flow stress in pure-iron and iron-copper alloys", *Mechanics of Materials*, vol. 101, pp. 71–80, Oct. 2016, [[DOI](#)].
- Chakraborty, P. and S. B. Biner, "Parametric study of irradiation effects on the ductile damage and flow stress behavior in ferritic-martensitic steels", *Journal of Nuclear Materials*, vol. 465, pp. 89–96, Oct. 2015, [[DOI](#)].
- Novascone, S. R., B. W. Spencer, J. D. Hales, and R. L. Williamson, "Evaluation of coupling approaches for thermomechanical simulations", *Nuclear Engineering and Design*, vol. 295, pp. 910–921, Aug. 2015, [[DOI](#)].
- Zhang, Y., P. C. Millett, M. R. Tonks, X.-M. Bai, and S. B. Biner, "Preferential Cu precipitation at extended defects in bcc Fe: An atomistic study", *Computational Materials Science*, vol. 101, pp. 181–188, Apr. 2015, [[DOI](#)].
- Zhang, Y., X.-M. Bai, M. R. Tonks, and S. B. Biner, "Formation of prismatic loops from C15 Laves phase interstitial clusters in body-centered cubic iron", *Scripta Materialia*, vol. 98, pp. 5–8, Mar. 2015, [[DOI](#)].
- Chakraborty, P. and S. B. Biner, "A unified cohesive zone approach to model the ductile to brittle transition of fracture toughness in reactor pressure vessel steels", *Engineering Fracture Mechanics*, vol. 131, pp. 194–209, Nov. 2014, [[DOI](#)].

Conference Papers/Presentations

- Hoffman, W. M., M. E. Riley, and B. W. Spencer, "Surrogate Model Development and Validation for Reliability Analysis of Reactor Pressure Vessels", *ASME Pressure Vessels and Piping Conference*, Vancouver, BC, Canada, July 2016.
- Huang, H. and B. W. Spencer, "Grizzly Model of Fully Coupled Heat Transfer, Moisture Diffusion, Alkali-Silica Reaction and Fracturing Processes in Concrete", *Proceedings of the 9th International Conference on Fracture Mechanics in Concrete Structures (FraMCoS-9)*, ed. by V. Saouma, J. Bolander, and E. Landis, 194, Berkeley, CA, May 2016, [[DOI](#)].
- Spencer, B. W., H. Huang, and G. Cai, "Tightly Coupled Multiphysics Simulation of Alkali-Silica Reaction", *ASCE Engineering Mechanics Institute Conference*, Nashville, TN, May 2016.
- Bai, X., H. Ke, P. Chakraborty, and Y. Zhang, "Multiscale Modeling of Radiation Damage Evolution and Radiation Hardening in Reactor Pressure Vessel Steels", *MRS Spring Meeting & Exhibit*, Phoenix, AZ, Mar. 2016.
- Zhang, Y., D. Schwen, X. Bai, and B. Spencer, "Coupling Lattice Kinetic Monte Carlo and Phase Field for Solute Precipitation in RPV Steels", *MRS Spring Meeting & Exhibit*, Phoenix, AZ, Mar. 2016.
- Backman, M., B. Spencer, R. Dodds, and B. Wirth, "Structural Integrity Analysis of Reactor Pressure Vessel with Lamellar Flaws in Grizzly", *TMS 2016*, Nashville, TN, Feb. 2016.
- Chakraborty, P., Y. Zhang, and S. B. Biner, "Predicting the Radiation Dependent Flow Stress and Cleavage Failure in RPV steels using Crystal Plasticity", *TMS 2016*, Nashville, TN, Feb. 2016.
- Schwen, D. and Y. Zhang, "Rapid Development of Phase Field Models for RPV Aging", *Materials Science and Technology*, Columbus, OH, Oct. 2015.
- Zhang, Y., P. Chakraborty, D. Schwen, X. Bai, M. Tonks, and B. Spencer, "Multiscale Modeling of Microstructure Evolution and Property Degradation in Reactor Pressure Vessel Steels", *Materials Science and Technology*, Columbus, OH, Oct. 2015.
- Spencer, B., M. Backman, W. Hoffman, and P. Chakraborty, "Reactor Pressure Vessel Integrity Assessments with the Grizzly Simulation Code", *Transactions of SMiRT-23*, Paper 710, Manchester, UK, Aug. 2015, [[URL](#)].
- Zhang, Y. F., X. M. Bai, M. R. Tonks, and S. B. Biner, "Formation of prismatic loops from C15 phase interstitial clusters", *2015 MRS Spring Meeting*, San Francisco, CA, Apr. 2015.

- Schwen, D., "Rapid Phase Field Model Development using the MOOSE Finite Element Framework", *TMS 2015*, Orlando, FL, Mar. 2015.
- Spencer, B., M. Backman, Y. Zhang, P. Chakraborty, D. Schwen, W. Hoffman, X. Bai, B. Biner, and H. Huang, "Grizzly: A Simulation Tool for Nuclear Power Plant Component Aging", *SIAM Conference on Computational Science and Engineering*, Salt Lake City, UT, Mar. 2015.
- Chakraborty, P. and S. B. Biner, "Modeling of Tensile Deformation in Irradiated RPV Steel", *7th International Conference on Multiscale Materials Modeling*, Berkeley, CA, Oct. 2014.
- Zhang, Y. F., X. M. Bai, M. R. Tonks, and S. B. Biner, "Preferential Cu Segregation at Extended Defects: An Atomistic Study", *NuMat 2014*, Clearwater Beach, FL, Oct. 2014.

Reports

- Spencer, B., M. Backman, P. Chakraborty, D. Schwen, Y. Zhang, H. Huang, X.-M. Bai, and W. Jiang, *Grizzly Usage and Theory Manual Version 1.0 Beta*, INL/EXT-16-38310, Idaho National Laboratory, Idaho Falls, ID, Mar. 2016, [[URL](#)].
- Spencer, B., W. Hoffman, S. Sen, C. Rabiti, T. Dickson, and R. Bass, *Initial Probabilistic Evaluation of Reactor Pressure Vessel Fracture with Grizzly and RAVEN*, INL/EXT-15-37121, Idaho National Laboratory, Idaho Falls, ID, Oct. 2015, [[URL](#)].
- Dolbow, J., Z. Zhang, B. Spencer, and W. Jiang, *Fracture Capabilities in Grizzly with the eXtended Finite Element Method (X-FEM)*, INL/EXT-15-36752, Idaho National Laboratory, Idaho Falls, ID, Sept. 2015, [[URL](#)].
- Huang, H., B. W. Spencer, and G. Cai, *Grizzly Model of Multi-Species Reactive Diffusion, Moisture/Heat Transfer and Alkali-Silica Reaction in Concrete*, INL/EXT-15-36425, Idaho National Laboratory, Idaho Falls, ID, Sept. 2015, [[URL](#)].
- Zhang, Y., D. Schwen, H. Ke, X. Bai, and J. Hales, *Mesoscale modeling of solute precipitation and radiation damage*, INL/EXT-15-36754, Idaho National Laboratory, Idaho Falls, ID, Sept. 2015, [[URL](#)].
- Chakraborty, P., S. B. Biner, Y. Zhang, and B. W. Spencer, *Crystal Plasticity Model of Reactor Pressure Vessel Embrittlement in Grizzly*, INL/EXT-15-35786, Idaho National Laboratory, Idaho Falls, ID, July 2015, [[URL](#)].
- Spencer, B., M. Backman, P. Chakraborty, and W. Hoffman, *Reactor Pressure Vessel Fracture Analysis Capabilities in Grizzly*, INL/EXT-15-34736, Idaho National Laboratory, Idaho Falls, ID, Mar. 2015, [[URL](#)].
- Spencer, B., M. Backman, P. Chakraborty, and W. Hoffman, *3D J-Integral Capability in Grizzly*, INL/EXT-14-33257, Idaho National Laboratory, Idaho Falls, ID, Sept. 2014, [[URL](#)].
- Spencer, B., Y. Zhang, P. Chakraborty, M. Backman, W. Hoffman, D. Schwen, S. B. Biner, and X. Bai, *Grizzly Status Report*, INL/EXT-14-33251, Idaho National Laboratory, Idaho Falls, ID, Sept. 2014, [[URL](#)].
- Spencer, B. and H. Huang, *Survey of Models for Concrete Degradation*, INL/EXT-14-32925, Idaho National Laboratory, Idaho Falls, ID, Aug. 2014, [[URL](#)].
- Novascone, S. R., B. W. Spencer, and J. D. Hales, *Status Report on the Grizzly Code Enhancements*, INL/EXT-13-30315, Idaho National Laboratory, Idaho Falls, ID, Sept. 2013, [[URL](#)].
- Spencer, B., Y. Zhang, P. Chakraborty, S. B. Biner, M. Backman, B. Wirth, S. Novascone, and J. Hales, *Grizzly Year-End Progress Report*, INL/EXT-13-30316, Idaho National Laboratory, Idaho Falls, ID, Sept. 2013, [[URL](#)].
- Zhang, Y., P. Chakraborty, and S. B. Biner, *Modeling of Late Blooming Phases and Precipitation Kinetics in Aging Reactor Pressure Vessel (RPV) Steels*, INL/EXT-13-30267, Idaho National Laboratory, 2013, [[URL](#)].
- Spencer, B., J. Busby, R. Martineau, and B. Wirth, *A Proof of Concept: Grizzly, the LWRS Program Materials Aging and Degradation Pathway Main Simulation Tool*, Idaho National Laboratory, 2012, [[URL](#)].

Other

- Spencer, B. W., Y. Zhang, P. Chakraborty, M. Backman, D. Schwen, and S. B. Biner, "Multiscale Approach to Reactor Pressure Vessel Integrity Assessment", *LWRS Newsletter*, no. 17, pp. 6–9, Feb. 2015, [[URL](#)].

Spencer, B. W., J. T. Busby, R. C. Martineau, and B. D. Wirth, "A Proof of Concept: Grizzly, an LWRS Program Materials Aging Simulation Tool", *LWRS Newsletter*, no. 11, pp. 1–5, May 2013, [[URL](#)].